

**REMARKS**

Reconsideration and allowance of the above-identified application are respectfully requested.

Claims 1-10, 24-33, 38-47, 65-74, 88-97, 102-111, 118-137, 155-164 and 171-180 are currently pending, wherein claims 1, 24, 38, 65, 88, 102, 118, 128, 155 and 171 are independent. Claims 11-23, 34-37, 48-64, 75-87, 98-101, 112-117, 138-154 and 165-170 have been canceled. Applicants reserve the right to file divisional applications directed to the non-elected claims.

Applicants note with appreciation the acknowledgment by the Patent Office of the Information Disclosure Statements previously submitted to the Patent Office on February 11, 2002.

Applicants would like to thank Examiner Joseph Torres for the personal interview conducted on February 24, 2005. In compliance with M.P.E.P. § 713.04, the substance of that interview is incorporated in the foregoing amendments to the claims and in the following remarks.

In the second section of the Office Action, the drawings are objected to for allegedly failing to comply with 37 C.F.R. 1.84(p)(5), because the drawings include the following reference characters that are allegedly not mentioned in the description: '50' in Figure 3 and '100' in Figure 6. This objection is respectfully traversed.

With regard to block 50 of Figure 3, the attention of the Patent Office is directed to page 6, paragraph 0013 of the present application which discloses that "the encoded information is then written to any suitable media and/or a communication channel (*block*

50).” [present application, page 6, paragraph 0013 (emphasis added)] With regard to block 100 of Figure 6, the attention of the Patent Office is directed to page 18, paragraph 0046 which discloses that “[a]s shown in FIG. 6, the decoding apparatus 93 reads the encoded bit stream from the media or channel 92 (block 94) and performs MLSD detection (block 96), reversed precoding (block 98), *run length limit decoding (block 100)* . . . .” [present application, page 18, paragraph 0046 (emphasis added)] As the present application discloses all reference numerals illustrated in the drawings, it is respectfully submitted that drawings fully comply with the mandates of 37 C.F.R. § 1.84(p)(5). Accordingly, reconsideration and withdrawal of this ground of objection are respectfully requested.

On page 3 of the Office Action, the abstract of the disclosure is objected to, because the abstract exceeds 150 words. Applicants hereby amend the abstract to reduce the number of words contained in the abstract to less than 150. Accordingly, reconsideration and withdrawal of this ground of objection are respectfully requested.

On pages 3 and 4 of the Office Action, claims 65-74 and 88-97 are rejected under 35 U.S.C. § 112, first paragraph, for allegedly failing to comply with the enablement requirement. These rejections are respectfully traversed.

The preamble of independent claim 65 recites “[a] computer-readable medium *having stored thereon* . . . .” executable instructions. The preamble of independent claim 88 recites “[a] computer-readable medium *having stored thereon* machine-executable instructions for communicating data from a source to a destination via a channel . . . .” The Patent Office asserts that “[t]here is no indication that the computer program set forth in the body of the claims provides any *useful* work for the computer readable medium; and nowhere in the specification does the Applicant teach that the body of the claims are directed to providing

any *useful* work for a computer-readable medium.” [Office Action, page 4] It is respectfully submitted that the Patent Office is misunderstanding and misinterpreting the claims of the present application, and misapplying and misconstruing the law regarding the enablement requirement of 35 U.S.C. § 112, first paragraph.

Initially, it is respectfully noted that the Patent Office is confusing the requirements of the patent laws. The Patent Office asserts that the computer program set forth in the body of these claims allegedly does not provide any *useful* work for the computer readable medium. It is respectfully submitted that “usefulness” or “utility” is a requirement of 35 U.S.C. § 101, which is separate and distinct from the requirements of enablement under 35 U.S.C. § 112, first paragraph. Thus, the Patent Office is rejecting these claims under the enablement requirement of 35 U.S.C. § 112, first paragraph, but then discussing how the claims are allegedly not showing utility. The Patent Office cannot simply mix and match the requirements of the patent laws at its discretion when examining the claims. Therefore, to help to resolve the confusion on the part of the Patent Office, the Applicants will attempt to address the rejections under the mandates of the enablement requirement of 35 U.S.C. § 112, first paragraph.

According to M.P.E.P. § 2164.01,

[t]he standard for determining whether the specification meets the enablement requirement was cast in the Supreme Court decision of *Mineral Separation v. Hyde*, 242 U.S. 261, 270 (1916) which postured the question: is the experimentation needed to practice the invention undue or unreasonable? That standard is still the one to be applied . . . . Accordingly, even though the statute does not use the term “undue experimentation,” it has been interpreted to require that the claimed invention be enabled so that any person skilled in the art can make and use the invention without undue experimentation.  
[M.P.E.P. § 2164.01]

In addition, it is a fundamental principle that “[a] patent need not teach, and preferably omits, what is well known in the art.” [M.P.E.P. § 2164.01 (citations omitted)]

More particularly, regarding the enablement requirement for computer-related inventions, “the disclosure must enable a skilled artisan to configure the computer to possess the requisite functionality, and, where applicable, *interrelate* the computer with other elements to yield the claimed invention, without the exercise of undue experimentation.” [M.P.E.P. § 2106 (emphasis added)] For example, according to M.P.E.P. § 2106, “[w]hen functional descriptive material is recorded on some computer-readable medium it becomes *structurally and functionally interrelated to the medium.*” [M.P.E.P. § 2106 (citations omitted)] In other words, “a claimed computer-readable medium encoded with a data structure defines *structural and functional interrelationships* between the data structure and the computer software and hardware components which permit the data structure’s functionality to be realized.” [M.P.E.P. § 2106] “Functional descriptive material” is defined as “data structures and computer programs which impart functionality when employed as a computer component.” [M.P.E.P. § 2106]

Accordingly, it is respectfully submitted that one of ordinary skill in the art would recognize that the storage of the “functional descriptive material” comprising the executable instructions (recited in the body of independent claims 65 and 88) on the computer-readable media would create “*structural and functional interrelationships* between the data structure and the computer software and hardware components which permit the data structure’s functionality to be realized.” [M.P.E.P. § 2106] Consequently, it is respectfully submitted that no undue or unreasonable experimentation would be needed to enable a person skilled in the art to make and use the invention, or to “*interrelate* the computer with other elements to

yield the claimed invention . . . .” Accordingly, it is respectfully submitted that independent claims 65 and 88 fully comply with the enablement requirement of 35 U.S.C. § 112, first paragraph.

During the interview, the Patent Office clarified its position. The Patent Office noted that exemplary embodiments of the present invention can be used with disk drives and the like. The Patent Office thereby interpreted the recitation of a “computer-readable medium” in the preamble as an embodiment with which the features recited in the body of the claims are to be used.

It is respectfully noted that the Patent Office is again confusing the requirements of the patent laws. By arguing “use,” the Patent Office is discussing the requirements of 35 U.S.C. § 101, even though this section of the Office Action refers to the enablement requirement of 35 U.S.C. § 112, first paragraph. It is respectfully submitted that the Patent Office’s position is not in accordance with the mandates of the enablement requirement of 35 U.S.C. § 112, first paragraph.

Furthermore, it is respectfully noted that the preamble of claims 65 and 88 recite a computer-readable medium “having stored thereon” the executable instructions recited in the body of the claims. Thus, the computer-readable medium can *store* the software instructions recited in the body of the claims. In other words, the computer-readable medium recited in the preamble of these claims is used for *storage purposes* to store the software instructions, as would be recognized by one of ordinary skill in the art. Although the executable instructions *stored on* the computer-readable medium can be used with other general purpose computers (e.g., disk drives, printers, routers and the like), the executable instructions can also be used in other fields such as Internet communications, telecommunications or any

processor-to-processor applications. However, such discussion of “use” is directed to the requirements of 35 U.S.C. § 101, not the enablement requirement of 35 U.S.C. § 112, first paragraph. Therefore, it is respectfully submitted that the Patent Office is misinterpreting and misconstruing the claims, as well as misconstruing and misinterpreting the mandates and requirements of the patent laws and rules regarding the enablement requirement of 35 U.S.C. § 112, first paragraph.

Dependent claims 66-74 and 89-97 variously depend from independent claims 65 and 88, and are in full compliance with the mandates of the enablement requirement of 35 U.S.C. § 112, first paragraph, for at least those reasons stated above with regard to independent claims 65 and 88.

For at least the foregoing reasons, it is respectfully submitted that claims 65-74 and 88-97 fully and completely comply with the enablement requirement of 35 U.S.C. § 112, first paragraph. Accordingly, reconsideration and withdrawal of these grounds of rejection are respectfully requested.

In the third section of the Office Action, claims 1-10, 24-33, 38-47, 65-74, 88-97, 102-111, 118-137, 155-164 and 171-180 are rejected under 35 U.S.C. § 112, second paragraph, for allegedly being incomplete for omitting essential elements. These rejections are respectfully traversed.

According to M.P.E.P. § 2106,

Applicant's claims, interpreted in light of the disclosure, must reasonably apprise a person of ordinary skill in the art of the invention. However, the applicant *need not explicitly recite* in the claims every feature of the invention. For example, if an applicant indicates that the invention is a particular computer, the claims do not have to recite every element or feature of the computer. In fact, it is preferable for claims to be drafted in a form *that*

*emphasizes what the applicant has invented* (i.e., what is new rather than old).  
[M.P.E.P. § 2106 (citations omitted) (emphasis added)]

With regard to the rejection of claims 1, 38, 118, 128 and 171, the Patent Office alleges that certain elements are omitted from these claims, in particular, “how the limitations in the body of the claim are related to the communication encoding.” [Office Action, page 5] It is respectfully submitted that Applicants have recited claims that emphasize what the Applicants have invented. For example, it is noted that claim 1 recites a communication encoding method that includes the steps of: obtaining initial binary data having a characteristic Hamming weight; determining the characteristic Hamming weight of the initial binary data; performing a comparison of the characteristic Hamming weight of the initial binary data with a predetermined value; and processing the initial binary data based on the comparison to thereby develop processed binary data having a Hamming weight not less than the characteristic Hamming weight of the initial binary data.

Additionally, it is respectfully submitted that such an allegation by the Patent Office clearly evinces a complete and total failure by the Patent Office to interpret the claims in light of the disclosure. For example, the present application clearly discloses that “the present invention employs an enhancement to the Hamming weight of the data prior to encoding to increase the effectiveness of the ECC and RLL encoding processes.” [present application, page 9, paragraph 0019] More particularly,

[t]he present invention provides one approach to improving the error-correction performance of an encoding/decoding scheme. Preferably, data is encoded using codes with small error propagation to enhance the effectiveness of the error correction coding (ECC) process. However, such codes generally have very low Hamming weights, such that a secondary encoding scheme is needed to enhance the Hamming weights of the codes while maintaining minimal loss in code rate. Such a secondary encoding scheme must improve the overall Hamming weight of the data sector to be communicated or stored

without requiring successful scrambling. In accordance with the principles of the present invention, this secondary encoding scheme may employ a Hamming weight encoder to enhance the Hamming weight of the data to be encoded prior to error correction coding of that data. [present application, page 17 – page 18, paragraph 0043]

Thus, it is respectfully submitted that a skilled artisan would recognize “how the limitations in the body of the claim are related to the communication encoding” when the claims are read in light of the disclosure. Accordingly, it is respectfully submitted that claims 1, 38, 118, 128 and 171 of the present application “reasonably apprise a person of ordinary skill in the art of the invention.” It is respectfully submitted that claims 1, 38, 118, 128 and 171 do not omit any essential element or step.

During the interview, the Patent Office clarified its position. The Patent Office asserted that since the preamble of these claims recite a communication encoding method or apparatus, the Patent Office is requiring an “encoded output” to be explicitly recited in the claims, i.e., the output of an *entire* encoding process. First, Applicants respectfully note that each of the aforementioned claims recites the element or step of “processing the initial binary data based on the comparison *to thereby develop processed binary data* having a Hamming weight not less than the characteristic Hamming weight of the initial binary data.” Thus, *processed binary data* is being developed or otherwise produced according to the steps or features of the claims. It is respectfully submitted that the Patent Office is simply ignoring recited features in the claims.

Additionally, “the applicant need not explicitly recite in the claims every feature of the invention. For example, if an applicant indicates that the invention is a particular computer, the claims do *not* have to recite every element or feature of the computer. In fact, it is preferable for claims to be drafted in a form that emphasizes what the applicant has



invented (i.e., what is new rather than old).” [M.P.E.P. § 2106 (citations omitted) (emphasis added)] It is respectfully submitted that the Applicants have recited claims that emphasize that which has been invented. To require the Applicants to recite each and every step or element in the *entire* encoding process would require Applicants to recite in the claims that which is old. No such requirement exists under the patent laws.

If this rejection is repeated, the Patent Office is requested to point out the precise law and/or rule, the exact section of the M.P.E.P., as well as the sentences within that section relied upon to support the Patent Office's unfounded requirement.

With respect to the rejection of independent claims 1, 24, 38, 65, 102, 118, 128, 155 and 171, the Patent Office alleges that the phrase “based on” is indefinite, because it allegedly “omits essential elements necessary to define the relationship between the processing and the comparison.” [Office Action, page 5] Again, it is respectfully submitted that the Patent Office is completely and utterly failing to interpret the claims in light of the disclosure, in derogation of the requirements of 35 U.S.C. § 112, second paragraph.

According to M.P.E.P. § 2173.02, “the test for definiteness under 35 U.S.C. § 112, second paragraph, is whether ‘those skilled in the art would understand what is claimed *when the claim is read in light of the specification.*’” [M.P.E.P. § 2173.02 (citations omitted) (emphasis added)] If one skilled in the art is able to ascertain the meaning of the terms used in the claim in light of the specification, 35 U.S.C. § 112, second paragraph, is satisfied. [*see* M.P.E.P. § 2173.02] As disclosed by the present application,

[t]he Hamming weight encoder preferably has knowledge about the data symbols that will not be RLL encoded by the RLL encoder. The user data 80, in the aggregate, is divided into several large groups of symbols. Each group is analyzed, and the total Hamming weight for the portion that is not to be RLL encoded is determined. This total Hamming weight is then compared

with a predetermined threshold Hamming weight value (e.g., a value equivalent to 50 percent of the length of the group of bits of the user data 80). If the total Hamming weight is too small (i.e., is less than the predetermined threshold Hamming weight value), then all of the bits in this group are inverted. . . . As will be readily apparent to those of ordinary skill in the art, this procedure ensures that the group of bits of data to be encoded has a Hamming weight that is at least as great as 50% of the size of the group. [present application, page 19, paragraph 0047]

“Breadth of a claim is not to be equated with indefiniteness.” [M.P.E.P. § 2173.04] Based on the foregoing, it is respectfully submitted that a skilled artisan would recognize “the relationship between the processing and the comparison” when the claims are read in light of the specification. Since the “scope of the subject matter embraced by the claims is clear, and . . . applicants have not otherwise indicated that they intend the invention to be of a scope different from that defined in the claims, then the claims comply with 35 U.S.C. § 112, second paragraph.” [M.P.E.P. § 2173.04] Consequently, it is respectfully submitted that the term “based on” is not indefinite, as “those skilled in the art would understand what is claimed when the claim is read in light of the specification.”

With regard to claims 10, 33, 47, 74, 97, 111, 127, 137, 164 and 180, and the phrase “wherein a symbol boundary of an encoded symbol does not change relative to error correction encoding,” the Patent Office asserts that these claims allegedly omit essential elements or steps, particularly “how a symbol boundary relates to any of the other data structures such as ‘initial binary data.’” [Office Action, page 5] The Patent Office further asserts that the phrase “does not change relative” is allegedly indefinite. It is respectfully submitted that the Patent Office is once again completely and utterly failing to interpret the claims in light of the disclosure.

For example, dependent claim 9, which depends from independent claim 1, recites that the step of “processing the initial binary data comprises performing at least one of error correction coding, run-length encoding, and precoding.” Thus, the step of processing the initial binary data to develop processed binary data can include one or more of the steps of error correction coding, run-length encoding, and precoding. Dependent claim 10, which depends from claim 9, recites that “a symbol boundary of an encoded symbol does not change relative to error correction coding.” According to an exemplary embodiment of the present invention, “the symbol boundary of an encoded symbol advantageously may be left unchanged relative to the error correction coding.” [present application, page 18, paragraph 0043] Thus, according to one exemplary embodiment, the error correction coding does not change the symbol boundary of an encoded symbol.

Based on the foregoing, it is respectfully submitted that a skilled artisan would recognize “how a symbol boundary relates to any of the other data structures such as ‘initial binary data’” when the claim is read in light of the specification. In particular, a skilled artisan would recognize that the symbol boundary recited in claim 10 refers to an *encoded symbol*, not initial binary data as asserted by the Patent Office, because the initial binary data is processed by one or more of the steps of error correction coding, run-length encoding and pre-coding as recited in dependent claim 9. Since the “scope of the subject matter embraced by the claims is clear, and . . . applicants have not otherwise indicated that they intend the invention to be of a scope different from that defined in the claims, then the claims comply with 35 U.S.C. § 112, second paragraph.” [M.P.E.P. § 2173.04]

Consequently, it is respectfully submitted that claims 10, 33, 47, 74, 97, 111, 127, 137, 164 and 180 do not omit any essential elements or steps, and that the term “does not

change relative to” is not indefinite, as “those skilled in the art would understand what is claimed when the claim is read in light of the specification.”

With regard to claim 65 and 88, the Patent Office again asserts that there is allegedly “no indication that the computer program set forth in the body of the claims provides any *useful work* for the computer readable medium; hence the body of the claim are not directed to a computer-readable medium.” [Office Action, page 5 – page 6]

Once again, it is respectfully noted that the Patent Office is confusing the requirements of the patent laws. The Patent Office asserts that the computer program set forth in the body of the claims does not provide any *useful work* for the computer readable medium. It is respectfully submitted that “usefulness” or “utility” is a requirement of 35 U.S.C. § 101, which is separate and distinct from the requirements of 35 U.S.C. § 112, second paragraph. Thus, the Patent Office is rejecting these claims under 35 U.S.C. § 112, second paragraph, but then discussing how the claims are allegedly not showing utility. As noted previously, the Patent Office cannot simply mix and match the requirements of the patent laws at its discretion when examining the claims. Therefore, to help to resolve the confusion on the part of the Patent Office, the Applicants will attempt to address the rejections under the mandates of 35 U.S.C. § 112, second paragraph.

According to M.P.E.P. § 2106, discussing the requirements of 35 U.S.C. § 112, second paragraph, and computer-related inventions, “the definiteness of the language must be analyzed, not in a vacuum, *but always in light of the teachings of the disclosure* as it would be interpreted by one of ordinary skill in the art. Applicant’s claims, interpreted in light of the disclosure, *must reasonably apprise a person of ordinary skill in the art of the invention.*” [M.P.E.P. § 2106 (emphasis added)]

As noted previously, it is respectfully noted that the preamble of claims 65 and 88 recite a computer-readable medium “having stored thereon” the executable instructions recited in the body of the claims. Thus, the computer-readable medium can *store* the software instructions recited in the body of the claims. In other words, the computer-readable medium recited in the preamble of these claims is used for *storage purposes* to store the software instructions, as would be recognized by one of ordinary skill in the art. Although the executable instructions *stored on* the computer-readable medium can be used with other general purpose computers (e.g., disk drives, printers, routers and the like), the executable instructions can also be used in other fields such as Internet communications, telecommunications or any processor-to-processor applications. However, such discussion of “use” is directed to the requirements of 35 U.S.C. § 101, not the requirements of 35 U.S.C. § 112, second paragraph.

Rather, as discussed previously, it is respectfully submitted that one of ordinary skill in the art would recognize that the storage of the “functional descriptive material” comprising the executable instructions (recited in the body of independent claims 65 and 88) on the computer-readable media creates “*structural and functional interrelationships* between the data structure and the computer software and hardware components which permit the data structure’s functionality to be realized.” [M.P.E.P. § 2106] Consequently, it is respectfully submitted that independent claims 65 and 88 “appraise a person of ordinary skill in the art of the invention.” Accordingly, it is respectfully submitted that independent claims 65 and 88 fully comply with the mandates of 35 U.S.C. § 112, second paragraph.

With regard to the rejection of claims 102 and 155, the Patent Office asserts that the disk drives recited in these claims allegedly omit essential elements, in particular, “how the

limitations of the body of the claim are related to communication encoding.” Yet again, it is respectfully submitted that the Patent Office is completely and utterly failing to interpret the claims in light of the disclosure, as required by the mandates of 35 U.S.C. § 112, second paragraph.

For example, claim 102 recites a disk drive that includes a data input for receiving initial binary data having a characteristic Hamming weight. The disk drive also includes a processor in communication with the data input for determining the characteristic Hamming weight of the initial binary data, performing a comparison of the characteristic Hamming weight of the initial binary data with a predetermined value, and processing the initial binary data based on the comparison to thereby develop processed binary data having a Hamming weight not less than the characteristic Hamming weight of the initial binary data. As noted in the present application, “[d]isk drives, of course, are well-known in the art, but additional information and a general circuit arrangement for one exemplary disk drive apparatus may be found, for example, in Wakamatsu U.S. Patent No. 6,011,666.” As noted in M.P.E.P. § 2106, “[c]laims and disclosure are not to be evaluated in a vacuum. If elements of an invention are well known in the art, the applicant does not have to provide a disclosure that describes those elements.” [M.P.E.P. § 2106] It is respectfully submitted that the Applicants have recited claims that emphasize that which has been invented. As disk drives are well-known in the art, it is respectfully submitted that Applicants’ claims directed to disk drives “reasonably apprise a person of ordinary skill in the art of the invention,” because a skilled artisan would recognize “how the limitations of the body of the claim are related to communication encoding” when the claim is read in light of the specification. Therefore, it is respectfully

submitted that independent claims 102 and 155 fully and completely comply with the mandate of 35 U.S.C. § 112, second paragraph.

Additionally, “the applicant need not explicitly recite in the claims every feature of the invention. For example, if an applicant indicates that the invention is a particular computer, the claims do not have to recite every element or feature of the computer. In fact, it is preferable for claims to be drafted in a form that emphasizes what the applicant has invented (i.e., what is new rather than old).” [M.P.E.P. § 2106 (citations omitted)] As noted repeatedly, it is respectfully submitted that the Applicants have recited claims that emphasize that which has been invented. To require the Applicants to recite each and every element of a disk drive would require Applicants to recite in the claims that which is old. No such requirement exists under the patent laws.

If this rejection is repeated, the Patent Office is requested to point out the precise law and/or rule, the exact section of the M.P.E.P., as well as the sentences within that section relied upon to support the Patent Office's unfounded requirement.

For at least the foregoing reasons, it is respectfully submitted that claims 1-10, 24-33, 38-47, 65-74, 88-97, 102-111, 118-137, 155-164 and 171-180 fully and completely comply with the requirements of 35 U.S.C. § 112, second paragraph. Accordingly, reconsideration and withdrawal of these grounds of rejection are respectfully requested.

On page 7 of the Office Action, claims 1-10, 24-33, 38-47, 65-74, 88-97, 102-111, 118-137, 155-164 and 171-180 are rejected under 35 U.S.C. § 112, second paragraph, for alleged indefiniteness. These rejections are respectfully traversed.

With regard to the rejection of claims 1, 24, 38, 65, 88, 102, 118, 128, 155 and 171, the Patent Office alleges that the phrase “based on” is indefinite. Initially, Applicants

respectfully note that this rejection is a repeat of the rejection posed in section 3, page 5 of the Office Action, as discussed previously. However, due to the evident confusion on the part of the Patent Office regarding the requirements of the patent laws, and the apparent inability on the part of the Patent Office to separate such requirements, the Applicants will again address this supposed rejection.

As discussed previously, it is respectfully submitted that the Patent Office is completely and utterly failing to interpret the claims in light of the disclosure.

According to M.P.E.P. § 2173.02, “the test for definiteness under 35 U.S.C. § 112, second paragraph, is whether ‘those skilled in the art would understand what is claimed when the claim is read in light of the specification.’” [M.P.E.P. § 2173.02 (citations omitted)] If one skilled in the art is able to ascertain the meaning of the terms used in the claim in light of the specification, 5 U.S.C. § 112, second paragraph, is satisfied. [see M.P.E.P. § 2173.02] As discussed previously, the disclosure of the present application clearly apprises a skilled artisan of the meaning of the terms used in the claim, particularly with respect to the term “based on.” [see, e.g., present application, page 19, paragraph 0047] Again, “[b]readth of a claim is not to be equated with indefiniteness.” [M.P.E.P. § 2173.04] Since the “scope of the subject matter embraced by the claims is clear, and . . . applicants have not otherwise indicated that they intend the invention to be of a scope different from that defined in the claims, then the claims comply with 35 U.S.C. § 112, second paragraph.” [M.P.E.P. § 2173.04] Consequently, it is respectfully submitted that the term “based on” is not indefinite, as “those skilled in the art would understand what is claimed when the claim is read in light of the specification.”



With regard to claim 65 and 88, the Patent Office again asserts that there is allegedly “no indication that the computer program set forth in the body of the claims provides any *useful* work for the computer readable medium; hence the body of the claim are not directed to a computer-readable medium.” [Office Action, page 7]

Yet again, it is respectfully noted that the Patent Office is utterly confusing the requirements of the patent laws. The Patent Office asserts that the computer program set forth in the body of the claims do not provide any *useful* work for the computer readable medium. It is respectfully submitted that “usefulness” or “utility” is a requirement of 35 U.S.C. § 101, which is separate and distinct from the requirements of 35 U.S.C. § 112, second paragraph. Thus, the Patent Office is rejecting these claims under 35 U.S.C. § 112, second paragraph, but then discussing how the claims are allegedly not showing utility. As noted previously, the Patent Office cannot simply mix and match the requirements of the patent laws at its discretion when examining the claims. Therefore, in a continuing effort to help to resolve the confusion on the part of the Patent Office, the Applicants will once again attempt to address the rejections under the mandates of 35 U.S.C. § 112, second paragraph.

According to M.P.E.P. § 2106, discussing the requirements of 35 U.S.C. § 112, second paragraph, and computer-related inventions, “the definiteness of the language must be analyzed, not in a vacuum, but always in light of the teachings of the disclosure as it would be interpreted by one of ordinary skill in the art. Applicant’s claims, interpreted in light of the disclosure, must reasonably apprise a person of ordinary skill in the art of the invention.” [M.P.E.P. § 2106]

As addressed previously, it is respectfully noted that the preamble of claims 65 and 88 recite a computer-readable medium “having stored thereon” the executable instructions

recited in the body of the claims. Thus, the computer-readable medium can *store* the software instructions recited in the body of the claims. In other words, the computer-readable medium recited in the preamble of these claims is used for *storage purposes* to store the software instructions, as would be recognized by one of ordinary skill in the art. Although the executable instructions *stored on* the computer-readable medium can be used with other general purpose computers (e.g., disk drives, printers, routers and the like), the executable instructions can also be used in other fields such as Internet communications, telecommunications or any processor-to-processor applications. However, such discussion of “use” is directed to the requirements of 35 U.S.C. § 101, not the requirements of 35 U.S.C. § 112, second paragraph.

Rather, as discussed previously, it is respectfully submitted that one of ordinary skill in the art would recognize that the storage of the “functional descriptive material” comprising the executable instructions (recited in the body of independent claims 65 and 88) on the computer-readable media would create “*structural and functional interrelationships* between the data structure and the computer software and hardware components which permit the data structure’s functionality to be realized.” [M.P.E.P. § 2106] Consequently, it is respectfully submitted that independent claims 65 and 88 “appraise a person of ordinary skill in the art of the invention” when the claims are read in light of the specification. Accordingly, it is respectfully submitted that independent claims 65 and 88 fully, completely and thoroughly comply with the mandates of 35 U.S.C. § 112, second paragraph.

For at least the foregoing reasons, it is respectfully submitted that 1-10, 24-33, 38-47, 65-74, 88-97, 102-111, 118-137, 155-164 and 171-180 are in full and complete compliance

with the mandates and requirements of 35 U.S.C. § 112, second paragraph. Accordingly, reconsideration and withdrawal of these grounds of rejection are respectfully requested.

In the fourth section of the Office Action, claims 1-10, 38-47, 65-74, 88-97, 102-111, 118-137, 155-164 and 171-180 are rejected under 35 U.S.C. § 101, because the claimed subject matter is allegedly directed to non-statutory subject matter. These rejections are respectfully traversed.

With regard to the rejection of independent claims 1, 38, 102, 118, 128, 155 and 171, the Patent Office alleges that these claims recite “an abstract algorithm that can be carried out by hand with no link to any tangible process, machine, manufacture, or composition of matter.” [Office Action, page 8] It is respectfully submitted that the Patent Office has clearly and unequivocally failed to apply the correct test for utility required under 35 U.S.C. § 101.

According to M.P.E.P. § 2106, “[t]he claimed invention as a whole must accomplish a practical application. That is, it must produce a ‘useful, concrete and tangible result.’” [M.P.E.P. § 2106 (citations omitted)] Although the courts have yet to define the terms “useful,” “concrete,” and “tangible” in the context of the practical application requirement, several examples are given in the M.P.E.P. that illustrate claimed inventions that have a practical application, because they produce useful, concrete and tangible results. For example,

transformation of data, representing discrete dollar amounts, by a machine through *a series of mathematical calculations* into a final share price, constitutes *a practical application of a mathematical algorithm, formula, or calculation*, because it produces “a useful, concrete and tangible result” – a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades. [M.P.E.P. § 2106 (citing *State Street Bank & Trust Co. v. Signature Financial Group Inc.*, 149 F.3d 1368 at 1373, 47 U.S.P.Q.2d 1596 at 1601 (Fed. Cir. 1998)) (emphasis added)]

In particular, a statutory process claim is illustrated as follows:

[a] digital filtering process for removing noise from a digital signal comprising the steps of *calculating a mathematical algorithm to produce a correction signal* and subtracting the correction signal from the digital signal to remove the noise. [M.P.E.P. § 2106]

Claim 1 of the present application recites, among other features, a communication encoding method that includes the steps of: obtaining initial binary data having a characteristic Hamming weight; determining the characteristic Hamming weight of the initial binary data; performing a comparison of the characteristic Hamming weight of the initial binary data with a predetermined value; and processing the initial binary data based on the comparison *to thereby develop processed binary data* having a Hamming weight not less than the characteristic Hamming weight of the initial binary data. Thus, just as in the digital filtering process example illustrated above, it is respectfully submitted that claim 1 produces a “useful, concrete and tangible result” in the processed binary data having a Hamming weight not less than the characteristic Hamming weight of the initial binary data. As discussed in the present application, “the present invention employs an enhancement to the Hamming weight of data prior to encoding to increase the effectiveness of the ECC and RLL encoding processes.” [present application, page 9, paragraph 0019] While such a “useful, concrete and tangible result” can be used in “general purpose computers (e.g., in disk drives, printers, routers, etc.), it is to be understood that the present invention may also find applicability in other noisy channels (e.g., wireless, etc.) and even in other fields such as Internet communications, telecommunications, or any processor-to-processor applications.”

[present application, page 21 – page 22, paragraph 0053] Therefore, it is respectfully submitted that independent claim 1 defines statutory subject matter.

According to M.P.E.P. § 2106, “[i]f a claim defines a useful machine . . . by identifying the physical structure of the machine . . . in terms of its hardware or hardware and software combination, *it defines a statutory product*. [M.P.E.P. § 2106 (citations omitted) (emphasis added)] For example, it is respectfully noted that claim 38 of the present application recites a communication encoding *apparatus* including *a data input* for receiving initial binary data having a characteristic Hamming weight. The apparatus also includes a *processor* in communication with the data input for determining the characteristic Hamming weight of the initial binary data, performing a comparison of the characteristic Hamming weight of the initial binary data with a predetermined value, and processing the initial binary data based on the comparison to thereby develop *processed binary data* having a Hamming weight not less than the characteristic Hamming weight of the initial binary data. Thus, not only is a “useful, concrete and tangible result” produced by the apparatus, but claim 38 also identifies the physical structure of the machine. It is respectfully noted that independent claims 102, 118, 128, 155 and 171 also recite the physical structure of the respective machines. Consequently, it is respectfully submitted that claims 38, 102, 118, 128, 155 and 171 define statutory products.

With regard to independent claims 65 and 88, each recites a computer-readable medium “having stored thereon” executable instructions for performing the communication encoding method according to exemplary embodiments. According to M.P.E.P. § 2106, “[w]hen functional descriptive material is recorded on some computer-readable medium it becomes *structurally and functionally interrelated to the medium* and will be statutory in

most cases since use of technology permits the function of the descriptive material to be realized.” [M.P.E.P. § 2106 (citing *In re Lowry*, 32 F.3d 1579, 1583-84, 32 U.S.P.Q.2d 1031, 1035 (Fed. Cir. 1994) (*claim to data structure stored on a computer readable medium that increases computer efficiency held statutory*))] In other words, “ a claimed computer-readable medium encoded with a computer program is a computer element which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program’s functionality to be realized, and is thus statutory.” [M.P.E.P. § 2106]

As discussed at length herein, exemplary embodiments of the present invention produce a “useful, concrete and tangible result” in the processed binary data. In addition, the executable instructions recited in the body of claims 65 and 88 recite functional descriptive material. “Functional descriptive material” is defined as “data structures and computer programs which impart functionality when employed as a computer component.” [M.P.E.P. § 2106] As the executable instructions define functional descriptive material, the executable instructions embodied in the computer-readable medium become “*structurally and functionally interrelated to the medium,*” and are, therefore, statutory.

Thus, it is respectfully submitted that independent claims 1, 38, 65, 88, 102, 118, 128, 155 and 171 recite statutory subject matter. It is respectfully submitted that the Patent Office is applying an incorrect and inappropriate test to determine whether the claims define statutory subject matter, and, therefore, is misapplying, misconstruing and misinterpreting the mandates and requirements of 35 U.S.C. § 101.

Dependent claims 2-10, 39-47, 66-74, 89-97, 103-111, 119-137, 156-164 and 172-180 variously depend from independent claims 1, 38, 65, 88, 102, 118, 128, 155 and 171, and

recite statutory subject matter for at least those reasons stated above with regard to independent claims 1, 38, 65, 88, 102, 118, 128, 155 and 171.

For at least the foregoing reasons, it is respectfully submitted that 1-10, 38-47, 65-74, 88-97, 102-111, 118-137, 155-164 and 171-180 define statutory subject matter in full and complete compliance with the mandates and requirements of 35 U.S.C. § 101. Accordingly, reconsideration and withdrawal of these grounds of rejection are respectfully requested.

In the fifth section of the Office Action, claims 1-10, 24-33, 38-47, 65-74, 88-97, 102-111, 118-137, 155-164 and 171-180 are rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Nazari et al. (U.S. Patent No. 6,456,208, hereinafter "Nazari"). These rejections are respectfully traversed.

Nazari discloses a method of constructing 32/33 and other RLL codes. For example, Figure 4 of Nazari illustrates "the initial part of the flow diagram for coding a 32 bit word to confirm to RLL restrictions and *produce* a code word that has a minimum Hamming weight of nine, no more than eleven consecutive logical zero's, and no more than eleven consecutive zero's in both even and odd interleaves." [Nazari, column 7, lines 15-21 (emphasis added); see also Nazari, column 5, lines 41-46, discussing the "coding rules for constructing a thirty three bit RLL code word [having] a minimum Hamming weight of nine."] It is respectfully submitted that the Patent Office is focusing on the end result produced by Nazari, substituting its own steps (gleaned from Applicants' own disclosure), and completely and utterly ignoring the intervening steps disclosed by Nazari.

According to Nazari, a thirty-two bit input code word is subdivided into four eight-bit interleaves: {intLO, intLE, intRO, intRE}. [see Nazari, column 5, lines 47-56] Each interleave is compared to Table A, illustrated in Figure 2, to determine if a violation of the

coding rules exists. [see Nazari, column 5, lines 56-58] “Once a violation is found the position of the ‘bad’ eight bit word in Table A is used to point to a four bit replacement in Table B.” [Nazari, column 5, lines 58-60] As disclosed by Nazari,

[f]or the right interleaves, intRO, and intRE, the data in the interleaves are directly compared to the eight bit words in Table A, and the four bit word pointed to in Table B is reversed and place into the appropriate right interleave in the output code word OUT. For the left interleaves, intLO and intLE, the data in the interleaves is reversed and compared to the ‘bad’ eight bit words in Table A and the four bit word pointed to in TABLE B is place into the appropriate left interleave in the output code word OUT. [Nazari, column 5, line 61 – column 6, line 2]

Thus, according to Nazari, subgroups of a code word are compared with values in a table. If “bad” values (i.e., coding rule violations) are found in a subgroup, the appropriate bit sequence (from Table B illustrated in FIG. 2) is substituted for the offending bits in the given subgroup. The resulting thirty-three output code word that is produced according to Nazari then conforms to the coding rules specified by Nazari, i.e., “there should be no more than eleven consecutive logical zeros in the output word OUT, no more than eleven consecutive logical zeros in both odd and even interleaves and a minimum Hamming weight of nine.” [Nazari, column 5, lines 41-46]

In complete contrast to Nazari, exemplary embodiment of the present invention employ an enhancement to the Hamming weight of data prior to encoding to increase the effectiveness of the ECC and RLL encoding processes. [see present application, page 9, paragraph 0019] According to an aspect of the present invention, such as recited in independent claim 1 of the present application, initial binary data to be communicated or stored is obtained. The characteristic Hamming weight of the initial binary data is determined. The characteristic Hamming weight of the initial binary data is then compared



with a predetermined value. The initial binary data is processed based on the comparison to thereby develop processed binary data having a Hamming weight not less than the characteristic Hamming weight of the initial binary data. The characteristic Hamming weight of the initial binary data preferably is determined by counting one-valued bits in the initial binary data, and the predetermined value preferably is a predetermined minimum Hamming weight threshold value. Processing of the initial binary data can comprise, for example, bitwise inverting of the initial binary data if the Hamming weight of the initial binary data is less than the predetermined value. [see present application, page 9 – page 10, paragraphs 0020 – 0021]

Therefore, it is respectfully submitted that Nazari does not disclose several steps or features of the present invention, including the steps of determining the characteristic Hamming weight of the initial binary data, and performing a comparison of the characteristic Hamming weight of the initial binary data with a predetermined value, as recited, for example, in claim 1 of the present application. Consequently, it is respectfully submitted that Nazari does not anticipate the subject matter of claim 1.

Independent claims 24, 38, 65, 88, 102, 118, 128, 155 and 171 recite features similar to those recited in independent claim 1, and are, therefore, patentably distinguishable over Nazari for at least those reasons stated above with regard to claim 1.

Dependent claims 2-10, 25-33, 39-47, 66-74, 89-97, 103-111, 119-127, 129-137, 156-164 and 172-180 variously depend from independent claims 1, 24, 38, 65, 88, 102, 118, 128, 155 and 171, and are, therefore, patentably distinguishable over Nazari for at least those reasons stated above with regard to independent claims 1, 24, 38, 65, 88, 102, 118, 128, 155 and 171.

For at least the foregoing reasons, it is respectfully submitted that Nazari does not anticipate the subject matter of claims 1-10, 24-33, 38-47, 65-74, 88-97, 102-111, 118-137, 155-164 and 171-180. Accordingly, reconsideration and withdrawal of these grounds of rejection are respectfully requested.

All of the objections and rejections raised in the Office Action having been addressed, it is respectfully submitted that the present application is in condition for allowance and a notice to that effect is earnestly solicited. Should the Examiner have any questions regarding this response or the application in general, the Examiner is urged to contact the Applicants' attorney, Andrew J. Bateman, by telephone at (202) 625-3547. All correspondence should continue to be directed to the address given below.

Respectfully submitted,

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